CORRESPONDENCE

Because we receive many more letters than we have room to publish we may shorten those that we do publish to allow readers as wide a selection as possible. In particular, when we receive several letters on the same topic we reserve the right to abridge individual letters. Our usual policy is to reserve our correspondence columns for letters commenting on issues discussed recently (within six weeks) in the BMJ.

Letters critical of a paper may be sent to the authors of the paper so that their reply may appear in the same issue. We may also forward letters that we decide not to publish to the authors of the paper on which they comment.

Letters should not exceed 400 words and should be typed double spaced and signed by all authors, who should include their main degree.

Data corruption

SIR,—In a world increasingly dependent on magnetic data storage, it is gratifying to see Dr A J Asbury's cautionary words (25 January, p 223) recognised as warranting a leading article.

All of Dr Asbury's comments are true, but it is unfortunate that he fails to mention (perhaps because he regards it as obvious) the simplest and most important precaution, which is available to us all. While hardware and software malfunctions do occur, a high proportion of problems inevitably result from physical damage to the storage medium —often resulting in total loss of all data in the case of a damaged disk.

This is all the more important as the storage capacity of magnetic disks increases. I work with a research database which has the potential to store data from tens of thousands of patients on a single disk. Dr Asbury acknowledges this but does not mention, let alone emphasise, the importance of always maintaining back up copies of all magnetically stored data. By using a standard system of "rotating archive copies" it is possible almost to eliminate the risk of losing more than a small amount of recently entered data, regardless of the nature or gravity of a system malfunction.

As a result of bitter experiences, I am obsessive about backing up all magnetic media but have grave difficulties in persuading colleagues to adopt even the simplest of backing up policies. While they often deny such protection to data, which they have striven diligently to collect, most do seem to recognise the need to have back up copies of software—which, ironically, is rarely irreplaceable.

As a student I was taught that it was unethical to transfuse a single unit of blood; if a patient did not require at least two units the inherent risks of transfusion were not justified. It should similarly be regarded as folly to have only one copy of magnetically stored data; if the importance of the data does not warrant at least two copies then the effort of collecting and storing it cannot be justified.

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SIR,—The time invested in collecting and storing information on a computer frequently results in the data being more valuable than the computer itself. Dr A J Asbury discusses some of the ways that these data can be corrupted and quite rightly emphasises the importance of protecting storage media by siting the computer away from smoke and dust.

In hospitals and surgeries throughout the United Kingdom microcomputers are being used increasingly by personnel not fully trained in the care of magnetic storage media such as floppy disks. From my own experience on a busy intensive care unit the commonest cause of data corruption is gross mishandling of the disk, such as that resulting from storage without a protective cover. Placing disks close to a strong magnetic field, such as on top of a visual display unit, is another cause of disk errors not mentioned in Dr Asbury's article. To minimise these problems one of the most important pieces of advice that can be given to a microcomputer database operator is "back up your data."

Occasionally data will be corrupted in spite of the most stringent precautions, although many operators are unaware that all is not necessarily lost. Often, especially in the case of disks corrupted by small pieces of dirt, most of the information can be recovered with the help of an expert using disk editing software designed for the purpose.

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SIR,—We agree with Dr A J Asbury (25 January, p 223) that poor software design is a major cause of unreliability in computer systems but are alarmed at the suggestion that software should be bought only after it has been available for a year or two in the expectation that, by then, "all its errors are likely to have been detected and corrected."

Obviously such advice is counterproductive and, if universally adopted, would prevent any new program ever being used. What disturbs us more, however, are the implicit assumptions that software cannot be designed to be error free from the outset, that an arbitrary period of field testing will expose all its errors, and that the process of error correction is itself free of error. Such assumptions may be relatively unimportant in trivial applications such as word processing but could be fatal in more crucial situations.

A program which has been in use without error for two years inspires far greater confidence than one which has merely had its errors corrected on detection. Fortunately, as in other branches of engineering, there are now available methods of programming which can prevent the intrusion of error,[1] and we look forward to a time when medical staff and other health care professionals insist that critical programs are designed and written in conformity to reliable standards by software engineers who have been certified competent to observe them.

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1 Gries D. *The science of programming*. Berlin: Springer-Verlag, 1981.